"Opinion Formation in Business Surveys: Empirical Evidence from German Micro Data"

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Short Abstract:

The article contributes to a broader understanding of how firms form its opinion in business surveys as we identify determinants of this process. In a large micro panel data set from the Ifo Business Cycle Test in Germany we employ the log-probability model to investigate relationships among categorical variables. Panel causality tests do not reveal strictly exogenous variables in the questionnaire. Ordered random effects probit panel estimations identify macroeconomic determinants of current situation and expectations. Furthermore we find some herding effect in the micro data.

Extended Abstract:

Business survey data is often used in empirical business cycle research and to study firm dynamics in empirical industrial organization. Especially understanding price and production expectations and expectation formation in general are important for understanding the dynamics of different branches. For inference and forecasting rather times series than micro data are used. As business survey data is almost (ordinal) categorical many quantification approaches are used to aggregate the micro data. It is well known that aggregation of time series leads to a loss of information. This loss can seldom considerably be reduced due to better aggregation techniques allowing for e.g. for asymmetric loss functions. In this paper we show that a concise analysis of micro data can lead to better understanding of firm dynamics and to an improvement of business cycle forecasts. All previous studies in this context have in common that they focus on characteristics (consistency, rationality) rather than determinants of expectations, realizations and appraisals in questionnaires. Furthermore to the best of our knowledge no empirical investigation exploited the panel micro structure of regular business surveys. Here our research sets in we want to shade some more light into the black box (Nerlove (1983)) of a firm with the regular questionnaire at hand. We want to understand what drives a specific expressed and revealed opinion at a certain point in time. We utilize a rich and unique data set by the Ifo Institute for Economic Research in Munich Germany, which publishes every month the Ifo Business Climate, which is one the most important indicators for the German economy. We analyze more than 1.2 millions observations in an unbalanced panel from 1980 to 2004 on the industry level. Almost all the data is trichotomous. The categorical data can be classified into three

groups: variables that reflect plans or expectations (ex ante data); variables referring to realizations (ex post data); variables indicating evaluations or appraisals of inventories, order backlogs and the like. Responses are in the form: Increase (+), normal (=), or decrease (-); or greater than normal (+), normal (=), or less than normal (-); too large (+), about right (=), or too small (-). The main questions ask for expectations and realisation (appraisals) of business conditions, production, inventories, backlog of orders and demand. We focus our analysis on the variables: assessment of the current business situation and the expectations for the six months. We ask what the driving forces behind the opinion formation process are. There is no general theoretical model for our question in mind. There are different expectation formation theories which are presented briefly. Especially the rational expectation hypothesis states that the enterprise incorporates any information at a specific point in time to form its expectation. We want to specify this information in our paper. We face the problem that we do not have regular information on different enterprises besides that given in the questionnaire. So in a first step we encounter the relationship among the different questions by employing the log-linear probability model and follow Nerlove (1983), Heinz, Koenig and Oudiz (1981). In allows us to reveal relationships among categorical variables. Furthermore we can quantify the strength of this relationship even for interactions of higher order. We estimate both saturated hierarchical (unconditional) as well as logit (conditional) models. In this framework we test briefly for adaptive, extrapolative and rational price and production expectations (based on contingency tables and polycloric correlations). The results are mixed and unstable over time. The rational expectations hypothesis is almost rejected for every model over different terms. The error-learning model describes the expectations data best and most parsimonious. The unconditional estimations show that almost any variable besides the price variables have a significant influence on the assessment of the current business situation and the expectations for next six month. Furthermore we find some higher interaction effects among the variables which are difficult to interpret. The results of the conditional model are similar to Nerlove (1983, Econometrica) and are stable and robust over time. For the current situation the expected production orders shows the strongest relationship for the expectations the backlog of orders.

For a structural model using the variables in the questionnaires we need causal relationships and exogenous variables. Nerlove (1983) said that identifying causal relationships in questionnaires is a "hazardous" task. We tackle this problem by employing a new approach for panel data proposed by Adams, Hurd, McFadden et al. (2003, Journal of Econometrics), which fits within in the approach of Granger (1969, Econometrica). They proposed a test for invariance with and without non-causality imposed, and for non-causality conditioned on invariance. In this framework the statement that a specific variable is strictly exogenous in a valid model is equivalent to the condition that other variables are conditionally non-causal for this variable in the given model. We conducted the test for invariance and non-causality for the assessment of the current business situation and the expectations for the next six months given the other variables in the questionnaire, i.e. demand, prices, backlog of orders among others. We reject the hypothesis that the two main variables are strictly exogenous. Furthermore we find reverse effects among business situation and expectations. This indicates that we firms utilize all information given in the questionnaire to form its opinion. Moreover this refers to the fact that firms incorporate several exogenous information simultaneously to answer different questions. With these results at hand we

cannot set up a parametric structural model within the questionnaire. We would need at least a simultaneous equation approach or better a VAR model for limited dependent variables. The former exists so far only for bivariate models and not for ordered categories and the latter one is a hot research topic which we leave for future research. Due to these results and as we do not have regular exogenous information of firms we use aggregated macroeconomic variables, like oil prices, exchange rates and indices for turnover, incoming orders and production in a panel estimation. We implement a latent variable model with two cut points, where assessment of the current situation and the expectations are unobservable. We estimate both a pooled as well a panel ordered probit model to investigate the determinants of expectations, plans, realizations and appraisals. In the random effects panel probit estimation we allowed for correlation of the regressors with the unobserved individual effect. Concerning the problem of initial conditions in nonlinear panels we follow the suggestions given in Wooldridge (2005, Journal of Applied Econometrics) by parameterizing the distribution of the individual effect. We focus our analysis on appraisals of the current business situation and the expectation for the next sixth months. We estimated both a static as well as a dynamic panel model. We experimented with different time periods as it is implausible that the unobserved firm-specific effect is unchanged over a long time period. Both in the balanced as well in the unbalanced case the results differ in an appropriate range, where the interpretation remains the same. The magnitude of the coefficients is quite similar between the pooled and the panel estimation, as only about 10% of the latent error variance is attributable to unobserved heterogeneity, which is measured by the intra-class correlation coefficient.

The results suggest that there is a strong state dependence both for the situation as well as for the expectations. This is confirmed by a formal test based on dummy variables. In all estimations almost all exogenous variables are significant and exhibit the expected negative sign, as one represents the best case. For instance a higher index for incoming orders leads ceteris paribus on average to better assessment of the current business situation. The oil price as a proxy for input factors shows a positive sign. The calculation of the partial average effects reveals that the turnover has the strongest influence for the current business situation and incoming orders for the expectations for the next 6 month. These results are closely related to those found in the log-probability analysis. We re-estimate the model with the lagged aggregated Ifo Business Climate as a regressor which turns out to be highly significant in each specification. If we regard the business climate as general indicator for the state of the economy this result is a hint for a kind of herd behaviour of firms. Some firms may take the evolution of the economy as the guideline for the evolution of its own business. This interesting result needs further consideration as endogeneity problems arise in this context.